

WHAT IS CLAIMED IS:

- 1 1. A method for encoding data channels in a CDMA system having data channel
2 interference cancellation, comprising the steps of:
3 identifying a non-orthogonal pilot signal using a channel code;
4 mixing a data signal having an in-phase portion and a quadrature portion
5 with a specific user channel code;
6 producing resultant signals using an output signal which is generated
7 during mixing of the data signal;
8 modulating the resultant signals using a PN code;
9 baseband discriminating the in-phase and the quadrature phase portions
10 of the data signal to produce second resultant signals;
11 modulating the discriminated in-phase portion and quadrature phase
12 portion of the data signal;
13 forming a composite output signal; and
14 transmitting the composite output signal to a base station.
- 1 2. The method of claim 1, wherein said identifying step comprises the step of:
2 modulating the non-orthogonal signal using the channel code.
- 1 3. The method of claim 1, wherein said mixing step comprises the step of:
2 modulating the data signal using the specific user channel code.
- 1 4. The method of claim 1, wherein said producing step comprises the step of:
2 summing output signals at a node in the CDMA system.

1 5. The method of claim 1, wherein said baseband discriminating step comprises the
2 step of:

3 spreading the in-phase portion and the quadrature phase portion of the
4 data signal.

1 6. The method of claim 5, wherein said spreading step comprises the step of:
2 modulating the in-phase portion and the quadrature phase portion of the
3 data signal using channel separation signals.

1 7. The method of claim 6, wherein said separation signals are orthogonal functions.

1 8. The method of claim 1, wherein said modulating the discriminated in-phase portion
2 and quadrature phase portion of the data signal comprises the step of:
3 modulating the discriminated in-phase portion and the discriminated
4 quadrature phase portion of the data signal using respective cosine and sine
5 functions.

1 9. The method of claim 1, wherein said forming step comprises the step of:
2 summing the second resultant signals.

1 10. An apparatus for encoding data channels in a CDMA system having data channel
2 interference cancellation, comprising:
3 means for identifying a non-orthogonal pilot signal using a channel code;
4 means for mixing a data signal having an in-phase portion and a
5 quadrature portion with a specific user channel code;
6 means for producing resultant signals using an output signal which is
7 generated during mixing of the data signal;

8 means for modulating the resultant signals using a PN code;
9 means for baseband discriminating the in-phase portion and the
10 quadrature phase portion of the data signal to produce a resultant signal;
11 means for modulating the discriminated in-phase portion and quadrature
12 phase portion of the data signal; and
13 means for forming a composite output signal.

1 11. A method for decoding data channels in a CDMA system having data channel
2 interference cancellation, comprising the steps of:
3 receiving a composite signal at a base station;
4 decoding the composite signal to generate first resultant signals;
5 demodulating the first resultant signals using a PN code to generate
6 second resultant signals;
7 demodulating the second resultant signal using channel separation
8 functions to generate demodulated resultant signals;
9 mixing the demodulated resultant signal with channel code data;
10 filtering mixed demodulated resultant signals to generate demodulated
11 data signals and a demodulated non-orthogonal pilot signal;
12 filtering the non-orthogonal pilot signal to remove interference;
13 generating pilot signal interference terms;
14 subtracting the pilot signal interference terms from the data signal; and
15 performing a dot product calculation using the filtered non-orthogonal
16 pilot signal and in-phase sub-band portions and quadrature sub-band portions of
17 the data signals to generate a decoded composite output signal.

1 12. The method of claim 11, wherein said decoding step comprises the step of:
2 demodulating the composite signal using respective cosine and sine
3 functions.

1 13. The method of claim 11, wherein said demodulating the second resultant signal
2 step comprises the steps of:

3 despreading the second resultant signal with respect to the in-phase
4 sub-band portions and quadrature sub-band portions of the data signal using a
5 first channel separation signal and a second channel separation signal,
6 respectively; and

7 despreading the second resultant signal with respect to the in-phase
8 sub-band portions and the quadrature sub-band portions of the data signal using
9 a third channel separation signal.

1 14. The method of claim 13, wherein the second channel separation signal is a complex
2 conjugate of the first channel separation signal.

1 15. The method of claim 14, wherein the first channel separation signal and the second
2 channel separation signal are orthogonal functions.

1 16. The method of claim 11, wherein said mixing step comprises the steps of:
2 demodulating non-orthogonal pilot signal components of the demodulated
3 resultant signals using the channel code data; and
4 demodulating in-phase sub-band portions and quadrature sub-band
5 portions of the demodulated data signal using a specific user channel code.

1 17. The method of claim 11, wherein said filtering step comprises the step of:
2 performing an integration and dump.

1 18. The method of claim 17, wherein said integration and dump comprises the steps
2 of:
3 comparing code lengths of the demodulated data signals to each other;
4 multiplying matching code lengths of the demodulated data signals; and
5 integrating multiplied and matched code lengths of the demodulated data
6 signals.

1 19. The method of claim 11, wherein said step of generating pilot signal interference
2 terms comprises the steps of:
3 modulating the demodulated non-orthogonal pilot signal, using the
4 channel code data to generate resultant output signals; and
5 modulating the resultant output signal, using a specific channel code of
6 a user to generate a first pilot signal interference term and a forth pilot signal
7 interference term.

1 20. The method of claim 19, further comprising the steps of:
2 subsequent to modulating the resultant output signals, using a specific
3 channel code of a user, modulating the resultant output signals using a first
4 channel separation signal and a second channel separation signal to generate a
5 second pilot signal interference term and a third pilot signal interference term.

1 21. The method claim 19, wherein the first channel separation signal and the second
2 channel separation signal are orthogonal functions.

1 22. The method of claim 11, wherein said step of performing a dot product calculation
2 comprises the steps of:

3 modulating cosine portions of the in-phase sub-band portions and cosine
4 portions of the quadrature sub-band portions of the data signal, using a cosine
5 portion of the demodulated non-orthogonal pilot signal to generate resultant
6 cosine in-phase sub-band portions and resultant cosine quadrature sub-band
7 portions;

8 modulating sine portions of the in-phase sub-band portions and sine
9 portions of the quadrature sub-band portions of the data signal using a sine
10 portion of the demodulated non-orthogonal pilot signal to generate resultant sine
11 in-phase sub-band portions and resultant sine quadrature sub-band portions;

12 summing the resultant cosine in-phase sub-band portions and the
13 resultant sine in-phase sub-band portions to generate a first composite signal
14 portion;

15 summing the resultant cosine quadrature sub-band portions and the result
16 sine portions of the quadrature sub-band portions to generate a second
17 composite signal portion; and

18 outputting the first composite signal portion and the second composite
19 signal portion as the decoded composite output signal.

1 23. An apparatus for decoding data channels in a CDMA system having data channel
2 interference cancellation, comprising the steps of:

3 means for receiving a composite signal at a base station;

4 means for decoding the composite signal to generate first resultant
5 signals;

6 means for demodulating the first resultant signals using a PN code to
7 generate second resultant signals;

1 means for demodulating the second resultant signal using channel
2 separation functions to generate demodulated resultant signals;

3 means for mixing the demodulated resultant signal with channel code
4 data;

5 means for filtering mixed demodulated resultant signals to generate
6 demodulated data signals and a demodulated non-orthogonal pilot signal;

7 means for filtering the non-orthogonal pilot signal to remove
8 interference;

9 means for generating pilot signal interference terms;

10 means for subtracting the pilot signal interference terms from the data
11 signal; and

12 means for performing a dot product calculation using the filtered
13 non-orthogonal pilot signal and in-phase sub-band portions and quadrature
14 sub-band portions of the data signals to generate a decoded composite output
15 signal.

1 24. A method for encoding/decoding data channels in a CDMA system having data
2 channel interference cancellation, comprising the steps of:

3 modulating a non-orthogonal pilot signal using a channel code;

4 modulating a data signal using a specific user channel code;

5 summing the modulated data signal and the modulated pilot signal to
6 obtain resultant signals;

7 modulating the resultant signals using a PN code;

8 spreading the modulated resultant signals using channel separation
9 signals;

10 modulating spread modulated resultant signals using respective cosine
11 and sine functions;

12 summing the spread modulated signals to form a composite output
13 signal;
14 transmitting the composite output signal to a base station;
15 receiving the transmitted composite output signal at a transceiver;
16 demodulating received composite signal using the respective cosine and
17 sine functions to generate a demodulated composite signal;
18 demodulating the demodulated composite output signal using a PN code;
19 demodulating the demodulated composite output signal using channel
20 separation functions to obtain demodulated resultant signals;
21 demodulating the demodulated resultant signals using the respective
22 cosine and sine functions;
23 filtering the demodulated resultant signals to generate a demodulated data
24 signal and a demodulated non-orthogonal pilot signal;
25 filtering the non-orthogonal pilot signal to remove interference;
26 generating first, second, third and forth pilot signal interference terms;
27 subtracting the first, second, third and forth pilot signal interference
28 terms from the data signal; and
29 performing a dot product calculation to generate an in-phase sub-band
30 data signal and a quadrature sub-band data signal.